

NCERT

**Mahadevi Verma
Third Memorial Lecture – 2010**

BY ARVIND GUPTA

Memorial Lecture Series



1907-1987

NCERT
MEMORIAL LECTURE SERIES

Mahadevi Verma Third Memorial Lecture
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ARVIND GUPTA



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OUR OBJECTIVES

The National Council of Educational Research Training (NCERT) is an apex organisation, assisting and advising the Central and State Governments by undertaking research, survey, and development, training and extension activities for all stages of school and teacher education.

One of the objectives of the Council is to act as a clearing house and disseminator of ideas relating to school and teacher education. We have initiated the Memorial Lecture Series in order to fulfil this role and to commemorate the life and work of great educational thinkers. Our aim is to strive to raise the level of public awareness about the seminal contributions made in the field of education by eminent men and women of India. We expect that such awareness will set off a chain of discourse and discussion. This, we hope, will make education a lively subject of inquiry while simultaneously encouraging a sustained public engagement with this important domain of national life.

The memorial lecture series covers public lectures commemorating the life and work of nine eminent Indian educational thinkers and practitioners.

Title and Venue of Memorial Lecture Series

Title	Venue
Gijubhai Badheka Memorial Lecture	Madras Institute of Development Studies, Chennai
Rabindranath Tagore Memorial Lecture	Regional Institute of Education, Bhubaneswar
Zakir Hussain Memorial Lecture	Regional Institute of Education, Mysore
Mahadevi Verma Memorial Lecture	Regional Institute of Education, Bhopal
B.M. Pugh Memorial Lecture	North East Regional Institute of Education Shillong
Savitribai Phule Memorial Lecture	SNDT Women's College, Marine Lines, Mumbai
Marjorie Sykes Memorial Lecture	Regional Institute of Education, Ajmer

Sri Aurobindo Memorial Lectures	SNDT Women's College, Marine Lines Mumbai
Mahatma Gandhi Memorial Lecture	Regional Institute of Education, Ajmer

We invite persons of eminence from academia and public life to deliver these lectures in English or any other Indian language. Our intention is to reach a large audiences consisting in particular of teachers, students, parents, writers, artists, NGOs, government servants and members of local communities.

The Annexure (Memorial Lectures 2007-2008) provides a summary of the lectures organised in the year 2007-08.

In due course the lectures will be made available on Compact Discs (CDs) and in the form of printed booklets in languages other than English or Hindi in which it is originally delivered for wider dissemination. Each booklet consists of two sections : Section one highlights the purpose of the memorial lectures and provides a brief sketch of the life and work of the concerned educational thinker and Section two gives the lectures in full along with a brief background of the speaker.

Section 1 in this booklet has been contributed by Dr. Shankar Sharan, faculty in the Department of Educational Research and Policy Perspective, at NCERT. In this section the writer highlights how Mahadevi Verma known as a great poetess was also a teacher by profession. He presents briefly her educational insights on philosophy of education and a comparative of the Indian and Western understanding of it, role of language, place of creative literature in curricula, problems of girls education, circumstances of unemployed youth and the poverty of modern Indian intellectuals enamoured with Western thoughts and phraseology. He draws attention to the fact that the observations made by Mahadevi Verma on all these issues are relevant to our current educational discourse.

Ms. Kalpana Sharma, is delivering the second Mahadevi Verma Memorial Lecture on 5 January 2009 at the Regional Institute of Education, Bhopal. Kalpana Sharma

is an independent journalist, columnist and media consultant based in Mumbai. In over three decades as a full-time journalist she was, until recently, Deputy Editor and Chief of Bureau of *The Hindu* in Mumbai. Her special areas of interest are environmental and developmental issues and she follows and comments on urban issues, especially in the context of Mumbai's development.

The theme of her lecture is *Can the media teach us anything?* In the wake of the terror attacks in Mumbai, on 26 November, 2008 she focuses on the importance of the media at times of such a crisis. She urges us to question: 'Should not the media as a whole, and the electronic media in particular, pause and consider the direction in which it is going?' She elaborates and further questions, "does it not have a responsibility towards its viewers, how is it shaping perceptions, is it more concerned about accuracy or about popularity, and how can it ensure that at times of crisis it acts as a conveyor of information and not panic?" She also highlights the need for the media to consider the impact of the depiction of violent events on young minds. There is a strong need for the media to realise its responsibilities and in her words, "the best way some such issues can be addressed is by internal guidelines developed by the media with the help of civil society representatives – including parents and teachers, as has happened in many other countries. We certainly do not need censorship or government control. But we do need to develop the tools of sensitivity and sobriety along with the awareness of the power we have to influence young minds."

We hope these lecture series will be of use to our audiences as well as the public in and outside the country in general.

I acknowledge the contribution of Ms Konsam Diana, Junior Project Fellow for helping me with the finalisation of this manuscript.

Anupam Ahuja
Convenor

ON MAHADEVI VERMA

MAHADEVI VERMA ON EDUCATION

SHANKAR SHARAN¹

Today's graduate has to think ... those who have all the worldly facilities want our life values. Why should those who already have such values consider themselves poor?

(Mahadevi Verma)

Mahadevi believed that a person is always a student in the realm of thought and of feelings. If not, then somewhere he must have closed the door of his heart and mind. She was renowned as a poetess, but in fact, she devoted a lot of time during her life to education and teaching. She had established the *Prayag Mahila Vidyapeeth*, which she served for as long as she could. Few people know that her devotion to education was a conscious choice as she believed that educational institutions built the nation and some of her great contemporaries have noted that. Sachchidanand Vatsyayan 'Agyeya' drew attention to the fact that according to Mahadevi, her poetry was the reflection of her moments of leisure and 'she would devote the rest of her life to the field of education, where it was required.'²

There are many definitions of 'Vidya' (knowledge/ education) in Indian literature. What Mahadevi liked the most was 'Sa Vidya Ya Vimuktye' – which means 'education is that which liberates'. She noted that in the past, Indian scholars had a very special regard for education and that is why it was always kept under state control.

Analysing education Mahadevi described two aspects of it: internal texture and external structure. The perceptible subject and its communication comprise the

1. Dr Shankar Sharan is a Lecturer in the Department of Educational Research and Policy Perspective at NCERT, New Delhi.

2. Agyeya, "Adhunik Kavi: Mahadevi Varma" in Trishanku (Surya Prakashan Mandir; 1973), p. 117

internal texture, while the *Guru* (the teacher), the disciple, curriculum and surroundings have a place in the external structure. All these six elements make up "the lotus of education" with all the six petals tied together carefully by language, the lack of which may cause these petals to scatter or fall off.

She considered education to be "the heart of society", which like purified blood, pumps new talent into administration, science, arts and literature, and into society, by and large. If new blood infused into the system by education is healthy, the system would, as a consequence, remain healthy and active. But "if germs of disease enter the system, all spheres would be fatally affected." How painfully true this statement is, can be seen today, in our country.

According to Mahadevi, ancient Indian thinkers planned education carefully since they believed that it played a role in regulating un-chiselled animal instincts in human beings, and shaped human potential. Therefore, neglecting education could take human society back to barbarism. Unfortunately, many countries in the world seem to aptly reflect this fact, today.

Only in this backdrop can it be understood as to why Mahadevi Verma was against drawing divisive lines between tradition and modernity in education. She had pointed out that we have misled ourselves by devaluing the great achievements of our past as the precondition of our future progress. "Only by incorporating the lines of tradition, which carry the history of human progress in the condition of the new era, can we add up new links in the century's long golden chain of development, and not by breaking off with them."³ Only plants, having been rooted in their own soil, can tolerate hot or cold gusts of wind coming from any side. "If they leave the base of their soil, neither the life giving breeze of *Malaya* nor the divine water of rain can keep them alive." The same thing was emphasised by Rabindranath Thakur when he said that emancipation from the bondage of the soil is no freedom for the tree.

3. Mahadevi Verma, "Siksha ka Uddeshya" in Mere Priya Sambhashan (New Delhi: National Publishing House, 1986), p. 3

That is why Mahadevi had warned our modernist intellectuals:

Due to the disconnect with the previous achievements of a society, "many cultures have vanished, and this fact can be verified from history." She was not oblivious to the fact that in the process of transmitting the past into present, sometimes unnecessary elements have also come to be preserved along with the valuable ones. In India's case, one more unfortunate fact is that the country had to suffer long periods of foreign subjugation, during which, the preservation of culture was more necessary than choosing valuable elements over those that were worthless. Therefore, it may have happened sometimes that 'a precious element was lost and a useless element was preserved'. However, that is not a matter of serious concern because, according to Mahadevi, in every period only those values last which prove their worth under all circumstances.

Mahadevi had felt from her long educational experience that communicating knowledge was more difficult than acquiring it. Therefore, the sphere of education was a twofold, mysterious laboratory, where one had to provide ample opportunity for the independent development of a student's inner world and of his personality and also help him connect harmoniously with the outer world. This is why Indian thinkers always felt that it was necessary to make the objectives of education clearer by classifying *Vidya* into *Para* and *Apara*, that is, for the benefit of others and valuable in itself. *Para* is a medium of self enlightenment while *Apara* is the means of its development under social circumstances.⁴

On education, Mahadevi's thoughts are quite similar to world famous educationist Leo Tolstoy. Both believed that education could be called 'preparation for life' only in its limited sense, and that, in its broader sense, it would be the ultimate goal of life. Tolstoy had emphasised that there was no such thing as 'the final goal of education'. Rather, it was the law of perpetual evolution that helped and directed real education. Therefore, by its very nature, the education of a man never ends or finishes forever.

4. Mahadevi Verma, "Matribhumi Devobhava" in *Mere Priya Sambhashan*, above, p.13

We must understand that if these classical references to education are overlooked or ignored, a serious disruption takes place in a given society. If education, for instance, is taken as beneficial only for worldly development, not only does it become one-sided, its real meaning is also lost. Such an education becomes a resultless activity with a meaningless preparation for life. It results in producing various diseases or malaises, which come to ail society. Therefore, considering one's education as only a means of personal progress and prosperity is not only harmful for the country and for society, it ultimately makes one 'a feeble person, who is devoid of self-perception'.

For Mahadevi Verma these were not idealist talks; these were practical facts about education. If proper care was not taken, concrete problems could arise, irrespective of whether the reasons for these problems could be identified. "From the beginning till the end, children are usually neither given moral education nor is any attention paid to building their character," she observed. This is why we shall find few young men "whose life contains the values of principles, courage, indomitable bravery and sense of respect and reverence for women."

According to Mahadevi, a person is "undeveloped" during childhood and "the question of the goal of his education is left unattended". In his adolescence, he is in his formative years. So the final goal - his education - is not considered. But when a youth arrives at the entrance of active life and faces his duties on his own with an unhealthy body and a frustrated mind, a critical situation arises for both him and for society. In a sense, this crisis has become severe in our country today.

It saddened Mahadevi to see that India had to suffer prolonged periods of defeat at the hands of foreigners:

And in this cursed voyage, it lost a valuable portion of life, and that was the philosophy of education. It remains undisputed that a victor is never satisfied with

*having merely the governing rights over the country he has defeated. He wants cultural victory as well over the conquered, for which the simplest and surest medium is a domination on education. Therefore, the objectives of education in a country ruled by foreigners can't be the same as in a self-governed country.*⁵

It is an irony that in independent India, its effective intelligentsia was not ready to understand this fact, let alone take requisite measures to counter it! But the fact remains that Mahadevi's views on education were fully in accordance with those of nationalist visionaries such as Rabindranath Thakur, Swami Vivekananda, Shri Aurobindo and Mahatma Gandhi. Her view clearly asserted that, "a self governed nation has to build able heirs for its valuable treasury of culture, society and nation, while the rulers of an enslaved country need only the helpers among the ruled people so as to just maintain the *status quo*. It's not surprising, therefore, if in both cases, the objectives of education were quite different, functionally as well with results."

According to Mahadevi, only in a free country was such an evolution of a future citizen useful, where qualities such as self-esteem, a sense of national identity, and the will to struggle against injustice were developed. Under foreign domination, on the contrary, the development of a new generation of governed subjects was "more threatening than weapons" for the ruling class. Since so far, we haven't changed the inferior education system provided by the colonial rulers, our field of education is disturbed, uncertain and disruptive. Free society and subjugated education are not coherent with each other and there is no way for us to move on without solving this contradiction.

Mahadevi also took note of the world scenario in so far as education was concerned. Analysing the extensive rebellion amongst students here and there, she underlined that in countries where the body of a citizen was free but his soul was enchained, and where soul was free but the body was in rigorous subjugation, education was at the

5. Mahadevi Verma, "Siksha ka Uddeshya" in *Mere Priya Sambhashan*, above, p. 6

centre of wild activity. From this she inferred that something new was taking birth in the inner depths of human consciousness, and that the pain was making the new generation restless. This restlessness was not only the result of a lack of material comfort. If that had been the case, dissent among students of materially prosperous countries like the United States of America wouldn't have been there.

In Mahadevi's view, the world has become unified due to the development of science. However, political conflicts are multiplying divisions among the people. This is a contradictory situation, which can be brought to order only by inducing a sense of higher objective of life. On the other hand, in India, internal and external conditions of the students are so disrupted that to infuse creativity in them is a tough task. The generation born in independent India has altogether different hopes and ambitions. But the last generation, despite being independent now, has yet not got freedom from mental subjugation, nor did it so far even feel it necessary to get it.⁶ This disorder has become a major obstacle in the full-fledged development of our student-class. Our students and educational scenario are in such a condition that although everything is there: education, training and various modes of communication, "what would be trained we don't know yet. There are no books on this, as such things are not in the purview of books. It is in our scriptures, in our philosophy, in our *dharma*."⁷ That is, it is in those things which we have presumed necessary to forget completely.

Finding no means of livelihood after completing education, or being instigation by political parties for various reasons are also causes of dissent amongst students. However, it should be understood that alteration of life's values and beliefs is also disturbing them. Without comprehending the goal of their education, they pass

6. This particular thought is recurring in Mahadevi's writings and speeches. Evidently she gave it much importance. She mentioned it also in her significant speech "Sahitya, Sanskrit aur Shasan" delivered sometime in the Legislative Council of Uttar Pradesh.

7. Mahadevi Verma, 'Matribhumi Devobhava' in *Mere Priya Sambhashan*, above, p. 14

through schools, colleges and universities, and never know where they would land. 'Be it primary or higher, our education system has not paid attention to the overall development of a human being'.

Those who are fortunate find jobs, while others feel that spending the golden years of their youth in colleges and universities is a meaningless waste of their time. But no thought is being given to this. It is the same for a self-governed society. Priceless years of its youth are being destroyed and it is watching silently, unable to think of requisite corrective measures. We have been witnessing that in the hope of decent jobs, millions of youth are engaged in a hopeless rat-race. Thus, having no livelihood solutions, even after completing education, and themselves being blamed by society for this condition, causes confusion among students. Some politicians exploit this state of students for their own selfish ends.

According to Mahadevi, if a student could get education that suits his talent and interest, he would not feel the need to involve himself in undue political activity. 'This question will arise not in student life. It will come to the fore only when he attains a certain amount of maturity, and when he is called upon to perform his social duty. Only then will it benefit society'. If a student who has an interest in science, art or literature finds the desired path for his creative talent to evolve and bloom, he would perhaps know that entering active politics at the wrong time would amount to a misuse of his time. Mahadevi had also advised those active in politics against using the student class as weapon, and asked them to change their ways in the greater interest of society. 'Sects of religion do not scare me but sects of politics do scare me', she said.

However, in Mahadevi's view, the most difficult problem regarding education is related to its inner nature and its medium. It is self evident that only the mother-tongue can be the appropriate medium of education for any child. But from the psychological point of view, the question of language is also concerned with culture and a sense of

national identity, especially for a country like India which has been subjugated as a nation despite having a great culture. Even in utility, the English language proves to be an obstruction, as most students fail in it and even those who do not fail, neither comprehend any subject through it nor become capable of expressing themselves fully. This situation persists even today, and we should be apprised of it. Some people may benefit from the predominance of the English medium in our education system but the importance accorded to English builds an inferiority complex and intellectual dumbness in our otherwise able youth. This fact is never taken into account. Mahadevi reminds us that the vision of our great thinkers and seers has helped us so far to counter the vagaries of subjugation, and has kept the path from being lost in darkness. "Language has been the flame of lamp for that light. *Pavaka nah Saraswati*."⁸

Being a sensitive teacher, Mahadevi felt that due to the deep relationship of language with human sensitivities, with perceptions and feelings, the desired development of a student becomes impossible due to the burden of English language. "Nothing can be more miserable for a thinking person than his inability to express himself and when this state of mind gets reflected in activity, it can only produce destructive tendency." This conclusion based on experience was not only an analysis but a warning too, ignoring which, we have not done the right thing. Mahadevi also tried to persuade those intellectuals and educationists of our country who believe that certain colonial legacies cannot be done away with. The educational framework given by the foreign rulers "has no strength to bestow humanism", she explained. Not only has a foreign language has been the medium of our education for a long time, it has also become for some of us, a proof of being erudite and highly cultured. Therefore, it is no wonder that many of us shudder at the thought of living without it. *Always recalling death as the ultimate fate of human beings, no treatment would seem necessary to an ailing person. So,*

8. Mahadevi Verma, "Bhasha ka Prashna" in *Mere Priya Sambhashan*, above, p. 22

to fulfil our national life the inner world of our nation must be made free. This work is hard and demands special efforts, as the chain binding the soul is stronger than the chains tying the body.⁹

Due to her broad-based vision, Mahadevi tried to make our intelligentsia understand that the problems faced by countries with ancient cultures used to be altogether different. Those having young civilizations did not have much to lose or change. And even if they changed, there was hardly anything to fear. But countries with ancient cultures risk great loss in any reckless change. In a misplaced enthusiasm for modernisation or radical transformation, if we lose our valuable heritage, it would be a great loss not only for the particular country but for all humanity. Thus, if a colonial legacy has become a fetter in the natural development of millions of Indians then saying that it cannot be helped is plain defeatism. In the very inspiring words of Mahadevi, "A river that springs from the heart of the Himalayas, whether a small current or a big one, does never ask for the way from the rocks. Has it ever asked to make banks of gold, silver or marble for it? It never said so. Crossing the mountains it moves on overtaking everything with a gusty speed and it is her principle to make her own banks." Similarly, our thoughtful people must build the path on which our nation could overcome the mental subjugation of centuries, not just the elite but every person in the country. And, this work cannot be accomplished by imitating others medium and models.

Therefore, the objective of our education must be to make the natural relationship with our culture lively. Only material prosperity and economic development cannot be the objective of education. If economic development could not be coordinated with the evolvement of the self, it would become an ugly phenomenon. "If someone asks you to give Ganga-Yamuna in exchange to get you to Mars, you would never agree. There is a reason: we are made of this land, we have a soulful relationship with it. You can

9. Mahadevi Verma, "Hamara Desh aur Rashtrabhasha" in *Mere Priya Sambhashan*, above, p.26

harmonise its message with science, but cannot leave it for science."¹⁰ It would be fatal to make merely personal economic advancement the sole goal of anyone's education. That would lead to a blind alley. This can be appreciated by looking carefully at the situation of the so-called developed countries. That kind of selfish goal creates 'mental unemployment', which is as miserable as unemployment itself. Not only has higher education, 'transformed itself into absolute dissatisfaction with life', it has sometimes become merely 'a means to get the necessary amenities for a comfortable life.'

Mahadevi believed that Indian students have the strength to face the challenges of the present times, and contribute significantly. 'If they recognise their inner strengths, then all doors would open automatically.' But for this to happen, one should have self-control over one's life. If our life is not disciplined or if we do not lead a balanced life, we can't get inner strength. Giving the example of electricity, Mahadevi explained that electricity is everywhere: in the sky, in the earth and in every atom; but you can't light a single lamp from it. Light would not get activated until it is collected first in a powerhouse which is a centre, and then and only then can the whole city be illuminated. "A similar process takes place in one's heart. If you concentrate or focus and hold your full strength, physical power, inner power, faith, belief and the power of your soul, and consider the strength you have, all dark clouds could go away. All the obstacles coming your way will be removed." She believed that if today's student recognises his latent strength, the disintegration of society could be contained and that social life would be free from all disparity. But if he fails to understand his duty, the entire nation could become weak and lost.¹¹

Mahadevi had a profound thought on the role of creative literature in education. Usually, we make literature a small part of the study of a language and not an essential part of education in general. Mahadevi was of the view that for every student, literature must have a very important place

10. Mahadevi Verma, "Matribhumi Devobhava" in *Mere Priya Sambhashan*, above, p.15

11. Ibid, p. 17

in his/her education. She considered it to be 'a chemical capable of removing the discrepancies of life.' Putting it in the perspective of history, she reminded us that the command of armed force creates a relationship of a conqueror and the conquered between two countries, while the influence of literature always bring harmony between two countries. Therefore, "We have to give such importance to literature and culture in education that a student may get the message of unity, fraternity or brotherhood of human beings and ultimately would become a more complete person."

Those who are familiar with the writings of Mahadevi Verma, knows the value of her thoughts on the status of women and their education. The great Hindi poet (*Maharani*) Nirala wrote this about Mahadevi: "Until now, through her, thousands of girl students have been benefited and become dignified." And in the field of education, "Mahadevi is greater than Sarojini Naidu. No doubt, her ideal in Hindi is greater than many great men."¹² Mahadevi had studied the contribution of great women scholars of ancient India and emphasised on learning from them. She did research on the great tradition of women education and the high status of women in social life as existed in our country. According to Mahadevi, in Indian tradition "there has been co-education with common methods for teaching. On completion of study, women graduates were involved in teaching also." It continued till 7-8th centuries. But then during the period of successive foreign rules many things changed in our country.

To bring about the required transformation in the life of women was one of her main concerns. According to her, Indian women are presently 'queens of the empire of ignorance.' On the other hand, the modern education currently being imparted to them takes away some good qualities from many young women. "We can't say easily about a girl student that she is an inquisitive student, because she comes out of her home like an unrestrained butterfly, far from the reality and sensitivity of life, and

12. Surya Kant Tripathi 'Nirala', "Mahadevi ke Janma-Divas Par" in *Chayan: Nibandh Sangraha*, (New Delhi: Rajkamal Prakashan, 1981) pp. 116, 117

does not mind becoming the centre of attraction of others."¹³ Therefore, we may find 'qualities like simplicity and humility, in illiterate women' but almost all the so-called literate women hardly have more than the ability to recognise letters and read some novels in exchange of giving up all their qualities'. The main reason for this sorry state, according to Mahadevi, is imparting education by the wrong kind of teachers. "If our children learn and get education under the guidance of such persons who do not have character and principles, who carry inherent weakness out of their own poor education and character, all these weaknesses would also affect the students." Mahadevi felt sad that we do not care to have even those qualities in our teachers, which we want to see in those people who perform ordinary jobs:

*Those teachers responsible for building the future of girls, the mothers of coming generations; our lackluster attitude towards them is an unforgivable fault. To provide the means for country-specific, society-specific and culture-specific mental development is true education by which a person feels harmony in his life and makes it useful for others too. This important task is not such that can be performed by a person ignorant of a distinct culture and one who is frivolous and weak in character.*¹⁴

Mahadevi was firm in her view that copying western societies was harmful for the upliftment of women here. Further, mechanical equality with men ultimately makes women more incapable and dependent. And, those educated men, who are 'weak, helpless and useless degree holders', should never be the ideals of women. Abandoning their natural qualities and unsuccessfully imitating men can lead educated women nowhere.¹⁵ Whatever seems on the surface, in fact, such women lose social and personal values. So, if we follow "such suicidal approaches of the

13. Mahadevi Verma, "Hamari Samasyayein: 2" in *Shrinkhala ki Kadiya*, (New Delhi: Radhakrishna, 1995), p. 117

14. Mahadevi Verma, "Hamari Samasyayein: 1" in *Shrinkhala ki Kadiya*, above, pp. 106-07

15. To understand in detail Mahadevi's thought on the situation, sorrows and the way to solve the problems before Indian women her book *Shrinkhala ki Kadiya* is most valuable. All the essays collected in this book centre on this issue.

western world, it would be as ridiculous as cutting one's feet to copy a disabled person."¹⁶ Basically, western approaches are hedonistic. Hence, relationships between men and women generally may not rise above such limitations even though the social courtesies of western societies may appear praiseworthy. Therefore, according to Mahadevi, if our women follow the western model of freedom, it will lead to other forms of distortions and abuses, not towards harmony, which is the life of a society.

Finally, Mahadevi had also assessed the Indian intellectual scenario in connection with the present education system. She noted that the present education system, "is not a bridge to bring us nearer but has become a big gulf to divide us, which our selfishness is widening day by day."¹⁷ This is an education after receiving we try to become persons whom a common man hesitates to approach. It is natural, then, that this type of education transforms our intellectuals into a hi-fi group who neither connect with the Indian people nor do the people feel comfortable mixing with them. Rather, some intellectuals are such, 'in whom education has turned into poison like the drops of *Swati (nakshatra)* changes in the mouth of a snake.'

This is why the intellectuals, who consider themselves so very important, are actually extremely incapable of contributing to the interest of the country. Most of them live and grow up with an intellectual inferiority complex, "whose even totally a lame dream, and who believe that just by attaching some foreign feathers, they have turned into messengers of heaven. Even their ugliest ideals, because they are in a western moulding, are identified as nothing more than being just pretty. Even their shoddiest views, with some foreign patches here and there, are taken to reign in the world of thought."¹⁸ Women intellectuals too, are the same. "As a pot of cold water lying near hot

16. Mahadevi Verma, "Navin Dashak mein Mahilaon ka Sthan" in *Mere Priya Sambhashan*, above, p.62

17. Mahadevi Verma, "Hamari Samasyayein: I" in *Shrinkhala ki Kadiya*, above, p. 103

18. Mahadevi Verma, "Chintan ke Kuchh Kshan" in *Deepshikha* (Allahabad: Bharti Bhandar, Samvat 2022 Vikrami), p. 41

water loses its cool unknowingly, similarly, educated women have silently adopted the weaknesses of men and come to visualise this condition as the reflective of success."¹⁹ That is why most women intellectuals also give more importance to meaningless mental exercises than the simple and truthful feelings of the people. They even take individual confusions as some valuable formulations, publicise it and make selfish enterprises their petty 'knowledge business'.

Mahadevi observed sadly that in such intellectuals, the outlines of culture are found broken and that the images of life are incomplete. For this reason, she tried to inspire us to be attached to our cultural roots, although with an independent mind, and find our way in a new era. Mahadevi's great contribution to education, culture and literature is comparable to any thinker of modern India. This doesn't pertain only to the subject of women education, to which Mahadevi devoted a lot of effort during her whole life to everything she had taken up to write and speak about. Her views send us valuable messages even till this very day:

*Why I ask this night of separation,
how much passed or remained?
Moments echo and the particles sing,
whenever they this way unwillingly come,
writing self-sacrificing for them
remained I an indelible message!*

19. Ibid, p. 104

SECTION 2

MAHADEVI VERMA

MEMORIAL LECTURE

SCIENCE THROUGH ACTIVITIES

ARVIND GUPTA

Abstract

The search for teaching science meaningfully to rural children has been a very challenging task for educators. Many attempts have been made in the past and there are several lessons to be learnt from them. Some like the Hoshangabad Science Teaching Programme (HSTP) worked in over a 1000 village schools for over two decades. The HSTP unleashed the creativity of thousands of children and teachers, but was ultimately shut down by the State government. Every innovation leaves behind seeds for future innovation.

Is the chalk-talk method best suited to teach science? Is the ability to regurgitate a few definitions an indicator of comprehension? Isn't expensive glassware and sophisticated plastic equipment in a typical school science laboratory a little out of sync with the lives of ordinary village children? Shouldn't the learning of science be made more contextual – something which a child can relate to with her everyday experiences?

How do children learn science? Perhaps science is learnt best when it goes beyond the four walls of the classroom and addresses the concerns and problems of the larger community. Then science becomes alive and vibrant. Also the use of local materials for making simple science models helps children assimilate them better.

Apart from outlining tried and tested field experiments the talk will be interspersed with practical and fascinating demonstrations.

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Arvind obtained a B.Tech. from IIT, Kanpur in 1975. He opted out of a lucrative career to devote his life to science popularisation. Currently, he works at the Mukhtangan Science Centre for Children located at the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune. He has been conferred numerous awards for his work, including the inaugural National Award for Science Popularisation amongst Children (1988), the Distinguished Alumnus Award by IIT, Kanpur (2000) and INSA's Indira Gandhi Award for Science Popularisation (2008). He has written a dozen books on science activities. His first book "Matchstick Models and Other Science Experiments" was translated in a dozen Indian languages.

SCIENCE THROUGH ACTIVITIES

I hear
and I forget



I see
and I remember



I do
and I understand





"Believe nothing, merely because you have been told to, or because it is traditional, or because you yourself have imagined it. Do not believe what your teacher tells you...merely out of respect for the teacher. But whenever after due examination and analysis you find conducive to the good, and benefit the welfare of all beings, that doctrine believe and cling to and take it as your goal."
 – Buddha

EVERYTHING HAS A HISTORY

In most schools science is still learnt by rote. Children mug up definitions and formula and spit them out in the exam. This is certainly not a good way to learn science. Science is perhaps a unique subject. The uniqueness stems from the fact that many of its postulates can be tested and verified by practical experiments. Most other subjects can be learned with ordinary tools—such as pencil, paper, blackboard, textbooks and a few supplementary aids. These are also essential for the teaching of science but, if they are the only tools, science becomes a dull and an uninteresting subject. This uniqueness results from the variety of materials and experiments necessary for its effective teaching.

If it is to be learned effectively science must be experienced. It must be learned and not learned about.

THE PHILOSOPHY

Ann Sayre Wiseman, creative director of the Children's Museum in Boston and the author of the landmark book, *Making Things*, summed up the essence of good science in these words:

It's OK to fail.
 It's OK to make mistakes.
 You will learn a lot from them.
 It's OK to take risks.
 It's OK to take your time.
 It's OK to find your own pace.
 It's OK to try it your own way.
 It's OK to fail.
 You can always try again free of fear.
 It's OK to look foolish.
 It's OK to be different.
 It's OK to wait until you are ready.
 It's OK to experiment (in safety).
 It's OK to question the "shoulds".
 It's special to be you.
 It is necessary to make a mess
 Which you are willing to clean up.
 (The act of creation is often messy)

GLEAM IN THE EYE

Children are naturally curious and have an innate desire to learn. Children also have a tremendous power to concentrate. If they are interested in a particular thing they put their heart and soul into it. They want to know it. They have a tremendous desire to understand how it works. Children learn a great deal without being taught.



Maria Montessori demonstrated this over a hundred years ago. She was Italy's first woman doctor. After getting her medical degree, Montessori started working with the children of slum dwellers. Montessori is famous the world over for her deep pedagogical insights. She had designed hundreds of teaching-aids for children. Several of them are still in active use, for instance, the post-box. This is a hollow wooden cubical box. On each surface of the box there is a cut-out of a particular geometrical shape — a circle, triangle, square etc. There are corresponding wooden blocks which have to be posted in the respective slots. A wooden ball, for instance, would go into the circular hole and a prism in a triangular slot.

There was an elderly priest who was very interested in Montessori's work. He would drop-by on a Sunday to see the various experiments, which Montessori was doing with the children. One day, Montessori took the priest to one corner of the class, where a little girl, was playing with the post-box. The little girl was deeply absorbed in her work. Montessori asked the other children to encircle the little girl and to sing a song aloud so as to disturb her concentration. But the little girl was so absorbed in her work—in trying to figure out which block will go into which slot that she did not even look up.

After some time Montessori lifted the little girl and seated her on a table. As soon as the little girl got her berth she once again got absorbed in trying to figure-out the block which will go into a particular slot. She was totally lost in her own world.

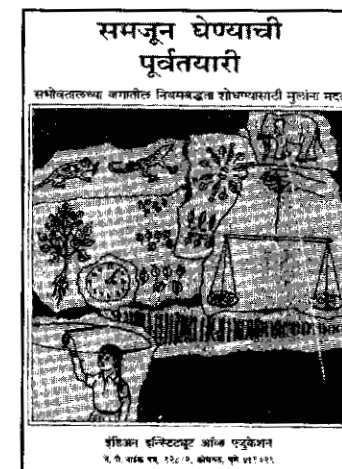
The priest—a good old Samaritan, often used to bring some toffees and chocolates for the children. On that day he had got a big box of biscuits. He started distributing biscuits to the children. He also gave the little girl a biscuit. The little girl reluctantly took the biscuit. She intently looked at it. She saw that the biscuit was rectangular in shape. So, she posted the biscuit in the rectangular slot of the post-box. Children do not learn through bribes. They learn because they want to understand the world. Mark

sheets, certificates, medals and prizes are bad substitutes for the real joy of knowing the world.

THE BEGINNING

Several pioneering experiments were done in India prior to Independence to make the learning of science contextual and interesting. One such well documented experiment took place in Himachal Pradesh in the 1920's.

Satyanand Stokes was an American who came to India in 1910. He pioneered the plantation and propagation of apples in Himachal Pradesh. Being a philanthropist, he also set up a school in Kotgarh for the local children. In 1920, the American economist Richard Greggs—deeply inspired by Gandhiji—came to work in India. For two years, Greggs taught activity based science to children in Stoke's school at Kotgarh. Based on his real life experiences with Indian children, he wrote a book titled *Preparation for Science* in 1928. This book was first printed by *Naujwan Prakashan* from Ahmedabad. This remains the most pioneering treatise on how science should be taught to children in Indian schools.



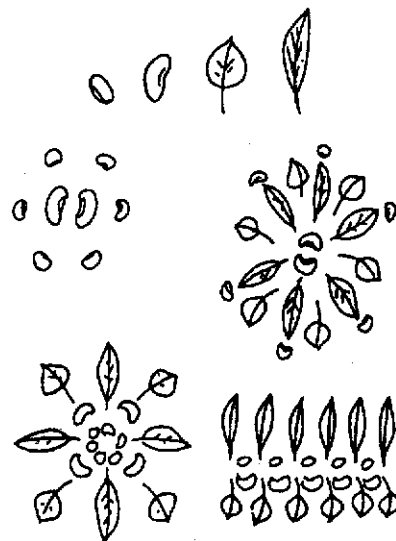
Greggs wrote:

The apparatus required is exceedingly simple and inexpensive, and almost all of it is familiar to

village children. Most of it can be made by village carpenters, potters or blacksmiths. The children must not get an idea that science is machinery or strange technology. The great pioneers of science did their work with very simple apparatus. It is possible, therefore, to follow their footsteps and learn to do scientific thinking without much expensive or elaborate apparatus. After all, the student's mind is the most expensive piece of apparatus involved.

Greggs further commented:

I do not want Indian children in villages to get the idea that science is only a school affair or only relates to shiny brass and glass devices and paraphernalia. I believe they can learn to think more clearly and to acquire a scientific attitude without all the expensive and complicated apparatus used in western laboratories, or at least with extremely little of it.



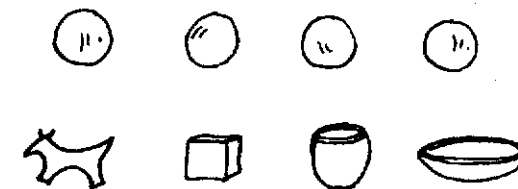
As has often happened in the history of science, the prophetic book written in 1928 remained buried until Keith Warren, a UNICEF consultant rediscovered it in 1975, illustrated parts of it, and brought it out as *Preparation for Understanding*.

This book helps children to discover an order in the world around them. Children are inspired to seek out patterns using pebbles, twigs, leaves, wire, seeds and other natural materials - stuff which is free and doesn't cost any money. Children who don't have paper or pencil could draw patterns on the ground with a stick. They could arrange leaves and seeds to make several *rangoli*-like patterns.



Pieces of a broken earthen pot could be joined with wet clay to create a whole. This is akin to solving a 3-D jigsaw puzzle.

In another exercise, a child takes four similar balls of clay. S/he then moulds each into a different shaped animal, a cube, a pot and a plate. The child is then asked:



Which one is heavier? Does the shape change the weight? Children pour out the same cupful of water in four different containers. Then they are asked, "Which vessel contains more water?"



The basic tenet of the book is : Before children can understand a thing, they need experience—seeing, touching, hearing, tasting, smelling, choosing, arranging, putting things together and taking things apart. Children need to experiment with real things.

This book is perhaps still the most relevant book on science activities for Indian village children. There is no plastic or glass apparatus—specialised science equipment to be bought. It shows that children learn best from simple things. And naturally it is most helpful for them to understand first those things that are around them in their daily lives.

It is best for two or three children to work together at these activities so that they can share materials and help each other. Thus they begin to learn cooperation.

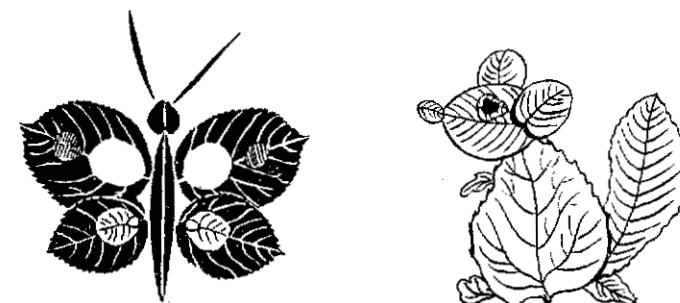
Science is built from curiosity, experience, analysis, and finally the expression of discovery. The main part of this process is arranging objects, activities and ideas so as to create a new order or pattern. Science is the discovery of new patterns. These exercises will help children discover the patterns and arrangements of the world around them by using their hands, senses and minds. So, Understanding is the discovery of order.

The Hindi edition of the book *Preparation for Understanding, Samajh Ke Liye Taiyari* is fortunately still being published by the National Book Trust.

OTHER EXPERIMENTS

After independence a few initiatives were taken in India to make science more interesting. During its formative years the NCERT reprinted a few science activity books developed by an American University. They were even translated into Hindi. Though the experiments came from an alien milieu and were not very contextual to Indian needs it was still a progressive step—a leap from the chalk-and-talk method and rote learning practised in most Indian schools. The NCERT also started the magazine *School Science* in which many pioneering Indian scientists – Prof. D. N. Wadia and Prof. P. N. Maheshwari regularly contributed articles of a very high quality. The classic *Story of Stone* by Prof. D. N. Wadia first printed in this magazine needs to be republished as an independent illustrated book at the earliest. Some of the other science classics published by the NCERT were the *Akashdarshan Atlas* – written by G.R. Paranjpe – the first Indian Director of the Royal Institute of Science, Bombay. This atlas gave the Indian names of all the stars and constellations and so it made much more sense to an Indian student. Other good science books published by the NCERT were *Our Tree Neighbours* by Chakravarti Venkatesh and *What on Earth is Energy* by D. P. Sengupta.

There were other isolated experiments to improve the way science was taught in schools. In the late sixties Meera Parasnis experimented in the Campus School in IIT, Kanpur to make the learning of science more experiential. She wrote a series of five illustrated books titled *Science in Action* in the early seventies. These books were brought out by Macmillan and paved the way for further experiments.



SPUTNIK SPURS RACE FOR SCIENCE SUPREMACY

On October 4, 1957, the Soviet Union successfully launched the Sputnik. Sputnik's launch changed everything. It had a world-wide effect on the way science was taught in schools. As a technical achievement, Sputnik caught the world's attention and the American public off-guard. That launch ushered in new political, military, technological, and scientific developments. The Sputnik shock shook the US and UK science establishment. Several new initiatives were taken to make science teaching more interesting.

In a unipolar world it is easy to forget the major role played by the Russians in popularising science in India. Many Russian science classics like Physics for Fun (1905), Fun with Astronomy written by the father of Russian popular science Yakov Perelman (1882-1942) were available in English, Hindi, Marathi and other regional languages in small towns on the pavement for a very moderate price.

Whereas the American books were expensive and only available in big towns, these beautifully illustrated Russian science books were available in taluka towns at a very affordable price. Many people of my generation owe their interest in science to the Russian popular science books.

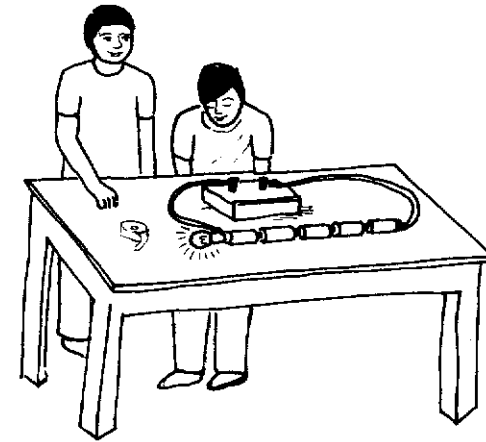
In 1905, for instance, Perelman demonstrated the use of standard coins – roubles and kopecks as standard weights. As these coins had been mint-made they had a standard weight and could be used by children as reference “weights”. Despite this it is sad to see the chapter on WEIGHT in most Indian books starts not with coins (which are accessible to every child) but with a picture of a fractional weight box!

NUFFIELD SCIENCE

The Nuffield Science Programme in the UK in the early 60's based itself on the discovery approach. Children were not doled out readymade answers. Instead, they were encouraged to fend for themselves and to discover the answer themselves. Children learn a great deal by themselves. It is unfortunate that schools provide very little space for children to mess around and discover things for themselves. But whenever there is a pro-child atmosphere the results are simply electrifying.

This happened in a Nuffield Science classroom in England. The junior science students were given a lot of torch batteries, bulbs, wires, resistance's etc. to experiment with. The children were supposed to familiarise themselves with these components and learn to make simple circuits. After the children had played with them and learnt to make a rudimentary torch etc. the teacher decided to test their knowledge about these components and gave them a practical quiz.

She gave them four identical wooden boxes with only two terminals on their top. Inside the box, the two terminals were either connected to a battery, a bulb, a resistance or



nothing at all (i.e., an open circuit). Children could only experiment by touching only the two terminals on the top of the box. They could only attach wires to these two terminals. They had to find out which box had which component hidden in its belly. It was fairly simple if there was just a battery hidden inside. The battery being an active element, if one just attached a bulb from outside it would glow. If there was an open circuit inside that was also easy to find out. But how does one find out whether it was a bulb or a resistance, hidden inside the box? It was a tough question and not at all easy to crack. If you connected a bulb and a battery from outside, in both cases the bulb would light up. Even the teacher, who had set up the quiz, did not have a clue to the answer.

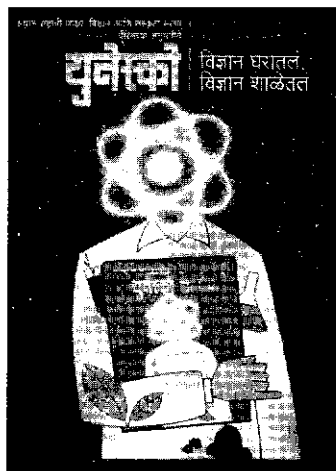
But a little boy found out the answer. When he connected a single battery and a bulb to the two terminals, his bulb lit up. As the glow of the bulb was a bit 'dim'—it meant that there was either a resistance or a bulb inside the box. Then he attached two batteries, and his bulb became a little bright. Then he just kept on adding more batteries and every time the glow of the bulb became brighter. But when he attached six batteries, the high voltage busted something inside and the circuit became open.

The little boy had found the answer because while playing he had fused two bulbs by connecting several batteries to them.

UNESCO SOURCE BOOK FOR SCIENCE TEACHING

Many nations were devastated during the Second World War. Later on, these countries built schools but had no money to set up science laboratories. At the behest of UNESCO, J.P. Stephenson, science master at the City of London School prepared a book on science activities titled *Suggestions for Science Teachers in Devastated Countries*. This fully illustrated book showed teachers how to make their own apparatus from simple, everyday materials at little cost.

The title of the book *Suggestions for Teachers in Devastated Countries* took the world by storm. It showed that expensive, fancy equipment were far removed from the lives of ordinary children – in fact very alienating. UNESCO agreed to widen and deepen the scope of the book and thus came out the famous *Unesco Source Book for Science Teaching* – which 50 years later still remains a bible for science activities. In 1963 this book was translated in Hindi by Professor Gorakh Nath and published by the *Publication Division*. Its third and last edition appeared in 1981. But for over a quarter century this wonderful book has been out of print in Hindi. At about the same time this book was translated in Marathi by Bhaskar Dhondur Karve – son of the great social reformer *Bharat Ratna* Maharishi Karve. One lone edition of the Marathi edition was published by *Orient Longman* in 1963



and then the book was shelved. Recently the book has been republished by *Manovikas Prakashan* and has been hailed as the rebirth of a major classic. The *UNESCO Source Book for Science Teaching* must have been translated by inspired individuals in other Indian languages too. But given the apathy towards activity-based science learning these language editions too must have been long buried into obscurity. I wish that someone would digitise and upload them on the internet for posterity.

The *UNESCO Source Book for Science Teaching* periodically revised and updated, has been translated into many languages of the world, reprinted scores of times and has sold several million copies.

Good science teaching must be based on observation and experiment. There can be no substitute for these. But performing experiments and learning to make close observations require special facilities, and these are lacking in many parts of the world, especially in the elementary and middle schools of poor countries. As a result, science teaching suffers a severe handicap in these regions. It is often believed—though erroneously—that to introduce laboratory teaching, even at the elementary level, requires elaborate equipment made by commercial manufacturers. Such materials are prohibitively expensive for most schools and in many parts of the world are quite unobtainable because they are not manufactured locally and cannot be imported because of the prohibitive costs.

HOSHANGABAD SCIENCE TEACHING PROGRAMME

The best Indian effort to revitalise school science education was certainly the Hoshangabad Science Teaching Programme (HSTP). Started in 1972, the HSTP eventually spread over 1000 government middle schools in 14 districts of Madhya Pradesh. Inspired by the Nuffield Science Experiment it was based on the discovery method—where children performed simple experiments and then answered questions based on what they did. They

were not “passive consumers” but “real constructors” of knowledge. There were no textbooks, only workbooks. The programme involved the active participation of teachers in designing the curriculum. It attracted many passionate and competent people. Professor Yashpal came as the first teacher trainer. It unleashed tremendous energy and creativity. The task was not just to replace standard flasks with local glass bottles. The search was for local substitutes, low-cost, non-alienating materials, close to the cultural milieu of the child. This required an open mind and a critical outlook. Children dispensed “dissecting needles” in favour of “babool” thorns (see box). Phenolphthalein – an indicator used for titration—was discovered in the well known brand of laxative “Vaculax”. The tablet was mixed in a known quantity of water to make a wonderful “indicator”.

A THORNY ISSUE



The Hoshangabad Science Teaching Programme (HSTP) emphasised on activity-based science learning. It was thought that the best way to learn science was by doing scientific experiments. There was a lot of emphasis on learning from the environment.

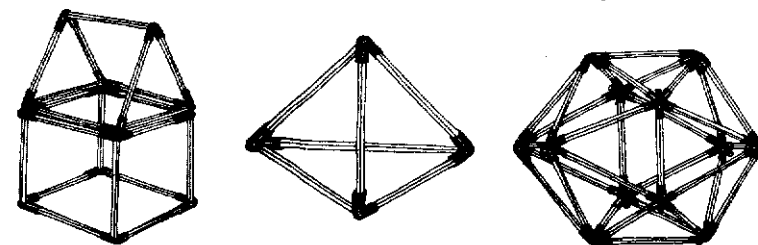
It was thought that the best way to learn about various types of plant roots was not by drawing pictures of taproots and fibrous—roots on the blackboard but by actually

stepping out of the classroom and studying these real plants in the field. For botanical observations the children were provided with hand lenses and dissecting needles.

One day the children went on a field trip. They were to collect different wild flowers and dissect them. Soon the children were cutting the flowers and examining the stamens, pistils and ovaries. They were all using their dissecting needles to pry open the flower parts. But one girl had forgotten to bring her dissecting needle. What could she do? She was searching for something pointed and sharp to open up the flowers. And soon she found a lot of *Babool* (*Acacia arabica*) thorns. These thorns were strewn all around and worked as beautiful dissecting needles.

This little girl had taught the Science Programme a great lesson. Why use the standard dissecting needle—a long steel needle embedded in a plastic handle, when you can use a thorn for the job. The needle had to be bought from the nearby town, as it was not available in the village. The thorn on the other hand was free. Millions of those thorns were crying to be picked up right there in the village. The humble *Babool* thorn had become an important tool for scientific inquiry!

The HSTP inspired by the Nuffield philosophy of “learning by doing” had to reinvent all the hardware to suit local conditions. The idea was to critically look at local



resources and find possibilities of doing innovative science using local, low-cost, easily accessible materials. The *Matchstick Mecanno* was used successfully to learn geometry and three-dimensional shapes. It used little bits of cycle valve tubes and matchsticks to make an array of

3-D structures. Matchsticks were readily found at home and as bicycles had made inroads in all our villages cycle valve tube could be bought locally.

The HSTP slowly spread from just 16 schools in the district of Hoshangabad to more than 1000 schools in 14 districts of Madhya Pradesh. At its peak over one hundred thousand village children learnt science using appropriate teaching aids, where the emphasis was on comprehension and not rote learning. Especial testing methods and examinations were devised which tested the child's "understanding" and not his/her ability to mug and spit.

But despite its innovative features the HSTP was shut down by the Government of Madhya Pradesh in 2002. Today, when the government is welcoming corporate partnership in the education sector, the HSTP was hailed as the largest intervention in science education and a grand partnership between the government and a NGO. The government provided the infrastructure, money and, in turn, the NGO providing the passionate human inputs. But, despite the fact that the programme had succeeded in demonstrating a paradigm shift—from rote learning to understanding, it was shut down. It was a big blow for thinking people. Why was this relevant, appropriate, cost-effective, tried and tested programme shut down? The reasons soon became clear. No government whether of the left or the right wants any organisation (private or NGO) to intervene in education at the mass level. The government



feels deeply threatened. As long as NGO's work in a few schools the state is happy. If there are more NGO's and more experiments the better for the state, because then the state can "showcase" and trumpet this "bouquet" of educational initiatives and can take legitimate credit for its liberal attitude for "letting a thousand flowers bloom". But if the experiment is of a radical nature promoting the attitude of "questioning" everything and if the intervention is on a large scale then the ruling class becomes jittery and politically stalls and "kills" the initiative.

The HSTP unleashed the creativity of thousands of teachers and gave an opportunity to academics in some of India's best research institutes to contribute their bit to make the learning of science more interesting in village schools—where their help was most needed. Though the Hoshangabad Science Teaching Programme was shut down the experience conclusively demonstrated that good science education in our village schools could be made interesting and fun and relevant using very cost-effective methods. The HSTP has inspired scores of individuals who are trying to implement it in their own regions with variations and regional specificities.

SCIENCE KITS

Experience the world over has shown that prepackaged science kits seldom work. On several occasions multinational organisations have appointed consultants and experts to design science kits for village schools. Then these kits are "mass" produced and distributed by a central authority to far flung village schools. This process is not unique to India alone. This is the experience of many developing countries. In most cases the kits lie unopened. As the teacher did not think of them, design them, assemble them so s(he) does not feel confident to use them. The kit could break when used. Who will bear the consequences? So the teacher simply keeps it locked.

But whenever teachers have been shown possibilities of making simple science models using everyday materials, readily available in their surroundings they have shown

great enthusiasm. When they make things with their own hands they feel "empowered" and are more likely to use them in practice. If something breaks they can always repair it.

We live in a consumerist society which produces mountains of junk—cardboard cartons, ball pen refills, old pens, coins, broomsticks, newspapers, cycle tubes, matchboxes, tetrapaks, milk bags, ice-cream sticks, straws, etc. The list is endless. All this stuff can be recycled back into joyous science models and toys for children.

RECYCLE! REUSE! REDUCE!

This ancient story carries a deep lesson about conservation in a consumerist society.

We buy, use and throw. Often we buy much more than we actually need. The whole consumerist culture is based on the principle: "Buy more! Throw more!" Today as we splurge—we plunder the earth's scarce resources and produce so much junk that not only our garbage dumps but even our parks overflow with rubbish.

But has it always been like this? Have we Indians always been so profligate and wasteful? No. History tells us that Indians have been fairly austere. They have had a different way of looking at the material world. According to this viewpoint a thing can have several uses. Not just one, but several lives. The concept of reuse/recycle has very deep roots in the Indian culture. This 5,000 year old story shows a deep respect and sensitivity for the material world. It has many lessons for modern day environmentalists.

One day the great Buddha was taking a round of the monastery.

He was approached by a monk who wanted a new woolen shawl (*angarkha*).

Buddha asked him, "What happened to your old shawl?"

"It had become very old and worn out. So I am presently using it like a bed sheet," replied the monk.

Buddha asked again, "But what happened to your old bed sheet?"

"Master, that bed sheet got old with use. It was worn and torn. So I cut it up and made a pillow cover out of it," replied the monk.

"But there certainly was a pillow cover before you made a new one. What did you do to your old pillow cover?" asked the Buddha.

"My head had rubbed a million times against the old pillow cover and made a big hole in it. So I made a foot mat out of it," replied the monk in earnest.

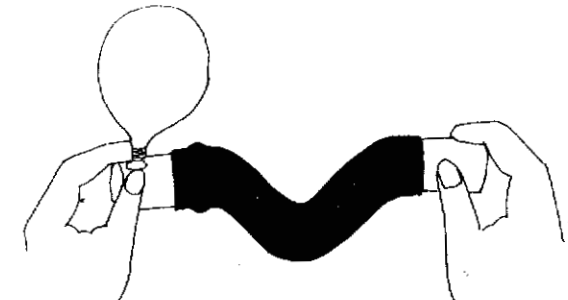
Buddha was not satisfied by this answer. He always delved deep into any issue. In the end he asked the monk, "Tell me what you did with your old door mat?"

The monk replied with folded hands, "Master the old door mat had got totally worn with use. Because of repeated use the warp and the weft had come out. So I took the cotton fibres and braided a wick out of them. Later I burned the cotton wick in the oil lamp."

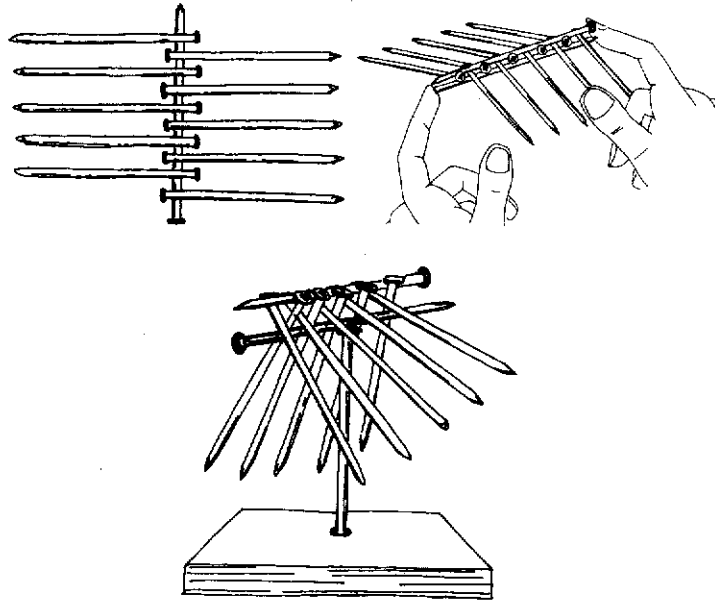
Buddha smiled after listening to the monk. The monk got a new shawl.

TOYS AND TRINKETS

There are many examples of creating fairly sophisticated science models from junk. For instance, primary school children could make a wonderful hand pump with two film cans joined by a length of old cycle tube with flaps of sticky tape for "valves". This inexpensive pump can inflate a balloon and throw water 10 feet away!



Another wonderful example is of trying to balance a dozen nails on the head of a vertical nail. This experiment does not require any specialised equipment—only nails and a piece of wood-materials which are amply available in the rural areas.



Toys have been used successfully to demonstrate principles of physics. Most inspiring physics teachers have their pet toys hidden away in drawers, cabinets and pant pockets. They include things like the dunking bird, gyroscopes, yo-yo's, a tippy-top, propeller on a notched stick, Newton's cradle, slinky and coupled pendulums. Most toys have an advantage over conventional demonstration equipment in their relatively low-cost and the fact that children relate well to them. Unfortunately most toys are not made for repeated use and that they are often no longer available when one looks for replacements!

Children understand best when they see a science principle incorporated in a toy. If they can play with it, then they get a better "feel" for it. "Centrifugal" and

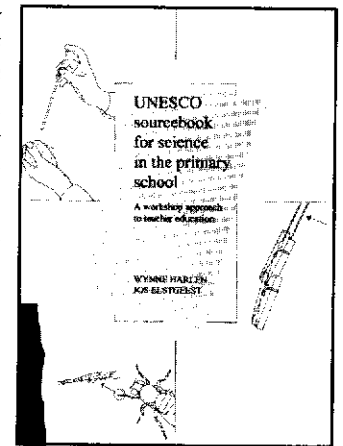
"Centripetal" forces are abstract words and mean little to children. But a broomstick "spinner" can lend meaning to these words. A self-made toy acrobat which flays its hands and legs when spun can concretise this concept. A hundred such wonderful science toys have been collated in a book titled *The Joy of Making Indian Toys*, by Sudarshan Khanna (published by the NBT and costing Rs 40 only). These toys have been there since ages. Every generation has enlarged this repertoire and left them behind in the public domain. These toys, made from 'throw away' stuff, are eco-friendly and the poorest children can enjoy them. In sculpting them, children learn to cut, trim, glue, fix and assemble together a variety of materials. They also learn great science.

The crisis of science is that people still do not want to dirty their hands. Rote learning, the chalk-and-talk method still reigns supreme. Everyone is out to "cover" the course, forgetting that the whole task of education is to "uncover" things.

PRIMARY SCHOOL SCIENCE

Over the years there has been a shift in thinking and schools are adopting more progressive measures. In many mainstream schools children in Class 7th or 8th are taken to the laboratory where the teacher "demonstrates" certain experiments—how to make oxygen etc. But still the children do not get a chance to do experiments with their own hands. Often the primary years are the most neglected phase where children seldom get a chance to mess around and do experiments.

The *UNESCO Source Book for Science in the Primary School*, authored by Winnie Harlen and Jos Elstgeest, was



first published in the early 1990s. Its international edition was priced at US \$20. Fortunately, the National Book Trust reprinted a low-cost Indian edition of this wonderful book priced at just Rs 95. This book has never been reviewed but it is still in the fourth reprint. This reposes our faith in ordinary teachers—a good book, reasonably priced, will sell well. The book has two parts: a theoretical section followed by four amazing science activity sections—*Children and Water*, *Children and Balances*, *Children, Mirrors and Reflections* and *Children and the Environment*. This book has already been translated and published in Hindi by the NBT. It will be wonderful if this book is published into other regional languages too.

Believing that science and the scientific method of problem-solving should play a significant role in any modern educational scheme, UNESCO offers this book in the hope that it will assist science teachers everywhere in their important work. The point of view taken is that science is most effectively taught and learned when both teacher and pupils practise the skills of problem-solving by engaging in group and individual study. The devising of experiments and the improvising of simple equipment for carrying them out should form no small part of such study. Thus, the present includes instructions for the making of many pieces of simple apparatus from materials usually found in almost any region. It also proposes a wide array of science experiments from which a teacher may select those most suitable for providing the observations upon which effective learning may be based.

In many parts of the world, science education occupies a comparatively insignificant place in primary-school education and unfortunately what actually happens in the classroom under the label of science is often totally inadequate. Teacher training both pre-service and in-service, is one of the keys to this problem. Starting from the premise that this training should be carried out in ways more closely related to the active methods which teachers are expected to use in their schools, this sourcebook

provides a variety of materials for use in training workshops for primary-school teachers which can be used both in group-work and by individual teachers for independent study.

The *String and Sticky Tape Experiments* column was introduced in the magazine *The Physics Teacher* brought out by the American Association of Physics Teachers (AAPT), in the early 1980's. It showed experiments using the simplest, least expensive materials. The materials could be purchased at the nearest store – you did not need anything expensive – not even need a stopwatch. All you needed were common rubber bands, cello tape, styrofoam or paper cups, string, drinking straws, glass marbles, plastic ruler, coins, pencil, paper and scissors to perform a series of wonderful process-based experiments.

CONCLUSION

In the last few years there has been a silent revolution underway in terms of the quality of state textbooks. The NCERT has tapped the best talents in the country to revise and upgrade its textbooks. This is very significant. For most of our children the textbooks perhaps will be the only books they will ever read. So, making them world-class is a major achievement we all can be legitimately proud of. This is also true of the science textbooks. Today the NCERT textbooks set new benchmarks for the private sector publishers to emulate. The internet has been a great leveller too. There are many organisations working to make education and specially science education more interesting and relevant for our children. Some pioneering experiments like the Hoshangabad Science Teaching Programme might have been shut down for myopic political reasons, but they have left behind seeds for future innovations.

ABOUT THE SPEAKER

Arvind Gupta

Arvind Gupta (born 1953) had his initial schooling in Bareilly (UP). After graduating in Electrical Engineering from IIT, Kanpur (1975) he worked with TELCO (Tata Motors) in Pune for a few years. In 1978, he took one year's study leave to work with the grassroots village science teaching programme run by Kishore Bharti in the Hoshangabad district of Madhya Pradesh. There he developed many useful low-cost science teaching aids using locally available materials. The possibilities of using ordinary things for doing science and recycling modern junk into joyous toys appealed immensely to children. During 1978, he also spent four months with the famous architect Laurie Baker in Trivandrum.

Arvind's first book *Matchstick Models and other Science Experiments* (1986) was translated into 13 Indian languages by different Popular Science groups and sold more than half a million copies. These science models and toys showed possibilities of doing hands-on science using low-cost, appropriate materials. These science models were widely featured in daily newspapers and magazines across the country. Over the years he has written 13 books on science activities and translated over a 100 books on science, environment and education in Hindi. He has conducted science workshops for children and teachers in over two thousand schools across the country. As a UNESCO advisor on science education he has worked with children and teachers in over 20 countries. In 2006, he was invited to Pakistan by Professor Pervez Hoodbhoy to work with school children in four different cities.

Arvind has presented over 110 TV programmes on science based fun activities, innovative toys and teaching aids on the national television. These films have been made by the NCERT and the UGC for countrywide classroom. He was featured as the *Green Guru* on the popular TV programme titled *Living on the Edge* and *Science Safari* produced by the National Geographic. He has also been

featured on *MAD* (Pogo), *Margdarshak* (ETV) and IBN-Lokmat.

His outstanding contribution in designing science teaching aids for young children has been recognised by several international organisations such as UNESCO, UNICEF, International Toy Research Association, Halmstad University, Boston Science Centre, MIT (Media Lab), Walt Disney Imagineering and Research and the International Play Association. In 2007, he won the *Most Innovative Workshop Award* at the Sasol Science Fair, Grahamstown, South Africa.

Arvind has been actively associated with the Bombay Natural History Society, Conservation Society of Delhi, Spastic Society of North India and the Bharat Gyan Vigyan Samiti (BGVS). He is an advisor to the National Book Trust, the NCERT and Manchi Pustakam on popular science books. The *Balvachan Series* of a 100 books which he edited for the BGVS has sold over a million copies.

Arvind has received several national and international awards for his outstanding contributions. These include the inaugural *National Award for Science Popularisation amongst Children* (1988), *National Association for the Blind Award* (1991) for designing teaching aids for blind children, *Hari Om Ashram Award* (1995) of the University Grants Commission, *Distinguished Alumnus Award* of IIT, Kanpur (2000) and the *Indira Gandhi Award for Science Popularisation* (2008) given by the Indian National Science Academy (INSA).

Since Oct 2003 he has been working at the Muktangan Children's Science Centre at the Inter-University Centre for Astronomy and Astrophysics in Pune. He continues to share his passions for science toys and books through his popular website <http://arvindguptatoys.com>.

ANNEXURE I
Memorial Lectures : 2007-08

Name	Date	Venue	Speaker	Theme	Chairperson
Mahatma Gandhi Memorial Lecture	17 January 2007	India International Centre, New Delhi	Professor Christopher Winch Educational Philosophy and Policy, Kings College London, U.K.	Individuals, Workers or Citizens Reflections on the Limits of School Based Educational Reform	Professor Mrinal Miri Former Vice-Chancellor N.E.H.U. Shillong
Zakir Hussain Memorial Lecture	19 January 2007	R.I.E. Mysore	Dr Radhika Herzberger, Director Rishi Valley School Chittoor Andhra Pradesh	Religion, Education and Peace	Prof. B.L. Chaudhary Vice-Chancellor Mohanlal Sukhadia University, Udaipur Rajasthan
Mahadevi Verma Memorial Lecture	17 August 2007	R.I.E. Bhopal	Prof. Karuna Chanana Former Professor at Zakir Hussain Centre for Educational Studies School of Social Sciences, J.N.U.	Women in Indian Academe: Diversity Difference and Inequality in a Contested Domain	Prof. R.S. Sirohi Vice-Chancellor Barkatulla, University Bhopal
B. M. Pugh Memorial Lecture	11 March 2008	Laitumkhrah Women's College Shillong	Shri Ratan Thiyam Chairperson, Chorus Repertory Theatre Imphal	Theatre Language and Expression	Professor T. Ao Dean, School of Humanities, N.E.H.U. Shillong

Name	Date	Venue	Speaker	Theme	Chairperson
Majorie Sykes Memorial Lecture	8 April 2008	R.I.E. Ajmer Jawahar Rang Manch, Ajmer	Ms Medha Patkar Social Activist	Socialisation vs. Politics of Education	Professor M.S. Agwani Former Vice Chancellor, J.N.U.
Sri Aurobindo Memorial Lecture	2 July 2008	Dorozi Hall Presidency College Kolkata	Shri Manoj Das International Centre of Education Sri Aurobindo Ashram Pondicherry	Education for a Faith in the Future	Professor Sanjib Ghosh Principal, Presidency College, Kolkata
Rabindranath Tagore Memorial Lecture	19 July 2008	R.I.E. Bhubaneswar	Professor N.R. Menon Member, Commission on Centre State Relations	Realising Equality of Status and of Opportunity: Role of Government, Judiciary and Civil Society	Professor Chandrashekar Rath Eminent Writer
Gijubhai Badekha Memorial Lecture	11 * September 2009	R.I.E. Mysore	Shri U.R. Ananthamurthy Jnanpith Awardee	My Writing My Times	Professor G.H. Nayak Kannada Literary Critic
Savitribai Phule Memorial Lecture	12 December 2008	Maniben Nanavati Women's College, Mumbai	Dr Sunderaraman Director State Health System Resource Centre	School as a Professor and Promoting Health Centre	Dr. (Ms) Vibhuti Patel Professor and Head Director PGSK S.N.D.T. Women's University

* Lecture was delivered in 2009 because the speaker was ill in 2008.

ANNEXURE II
Memorial Lectures : 2008-09

Name	Date	Venue	Speaker	Theme	Chairperson
Mahatma Gandhi Memorial Lecture	28 January 2009	N.I.E. Auditorium N.C.E.R.T. New Delhi	Shri Anupam Mishra Gandhi Peace Foundation Delhi	Raj Samaj Aur Pani	Professor M. H. Qureshi <i>Former Professor Geography, Centre for the Study of Regional Development J.N.U.</i>
Zakir Hussain Memorial Lecture	30 January 2009	R.I.E. Mysore	Professor Padmini Swaminathan Madras Institute of Development Studies Chennai	Literacy and Levels of Formal (General and Professional) Education of the Indian Population: A National Report Card	Professor B. Shaik Ali <i>Former Vice-Chancellor Mangalore and Goa University</i>
Mahadevi Verma Memorial Lecture	5 January 2009	R.I.E. Bhopal	Ms Kalpana Sharma Former Chief of Bureau, The Hindu Mumbai	Can Media teach us anything?	Dr Pushpendra Pal Singh <i>Head, Department of Journalism, National University of Journalism and Communication, Bhopal</i>

Name	Date	Venue	Speaker	Theme	Chairperson
Rabindranath Tagore Memorial Lecture	14 January 2009	R.I.E. Bhubaneswar	Professor Swapan Majumdar Director Culture and Relations Vishva Bharati	Education as Empowerment Twins in Search of an Alternative Education	Professor Shantanu Kumar Acharya <i>Eminent Writer</i>
Gijubhai Badekha Memorial Lecture	20 January 2009	M.I.D.S. Chennai	Professor T. S. Saraswathi, <i>Former Professor, Maharaja Sayaji Rao University Baroda</i>	Culture and Development Implication for Classroom Practice	Professor S. Jankarajan <i>Director Madras Institute of Development Studies</i>
Savitribai Phule Memorial Lecture	29 January 2009	S.N.D.T. Women's University Mumbai	Professor Sharmila Rega Director Kratiyoti Savitribai Phule Women's Study Centre, University of Pune	Education as Tritiya Ratna: Towards Phule Ambedkarite Feminist Pedagogies	Professor Chandra Krishnamurthy <i>Vice-Chancellor S.N.D.T. Women's University</i>
Sri Aurobindo Memorial Lecture	27 March 2009	Presidency College Kolkata	Professor Jasodhara Bagchi, <i>Former Professor Jadavpur University</i>	Education for Women and Women for Education : the Case of Bengal	Professor Sanjib Ghosh <i>Principal Presidency College Kolkata</i>
B. M. Pugh Memorial Lecture	27 March 2009	Don Bosco Youth Centre Shillong	Shri P. Sainath <i>Rural Affairs Editor The Hindu, Mumbai</i>	India in the Age of Inequality : Farm Crisis, Food Crisis and the Media	Ms Particia Mukhim <i>Editor, Shillong Times</i>
Majorie Sykes Memorial Lecture	28 October 2009	R.I.E. Ajmer	Professor Kamal Datta <i>Former Professor Department of Physics Delhi University</i>	What should we teach? An Examination of Issues underlying the College Curriculum.	Professor Bhagirath Singh <i>Vice-Chancellor M.D.S. University Ajmer</i>